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$\delta^{97/95}\text{Mo}$ in molybdenites from the Azegour skarn (Morocco)

BREILLAT NOEMIE ^{1,2}, GUERROT CATHERINE ¹, NEGREL PHILIPPE ¹, MARCOUX ERIC ²

¹BRGM, ISTO, UMR 7327, BP 36009, 45060 Orléans, France

(n.breillat@brgm.fr)

²Univ d'Orléans, ISTO, UMR 7327, 45071 Orléans, France

Molybdenum (Mo) isotopes are frequently used to investigate ocean and lake (paleo-)redox conditions. In the frame of mineral resources, only few studies have been performed regarding Mo-Re-Os isotopes. The aim of this study is to understand the source, processes and mobility of metals concentrations using Mo isotopes on molybdenites in different ore deposits. The present study focuses on the Azegour skarn (Morocco). Located in the High-Atlas, the Azegour site is one of the rare Mo-W-Cu exploited skarns (three historic mines). It is formed by a granitic intrusion (271±3Ma) in cambrian volcano-sedimentary serie composed by schists, volcanic complex (andesites, pyroclastites) and carbonate formations (calcareous and dolomites). The skarn takes place in the carbonate formations where pyroxenites and grenatites occurred. The grenatites being the Mo-bearing minerals in the form of molybdenites.

Molybdenites sampling has been performed in the main mine (Azegour) and in the Tizgui mine (1km north of the Azegour mine). The Mo isotopic composition has been determined on molybdenites using a MC-ICP-MS Neptune after aquaregia dissolution and adjustment to [Mo] = 1 µg.g⁻¹. The $\delta^{97/95}\text{Mo}$ ratios have been normalized to NBS3134 and a reproducibility of 0.07‰ (2σ) is reached.

Presently, we have analysed 12 molybdenites from Azegour and 2 from Tizgui and 14 others are in progress. Regarding the first 14 samples, the $\delta^{97/95}\text{Mo}_{\text{NBS}}$ ratios vary between -0.40 and 0.32‰ for Azegour and between 0.08 and 0.30‰ for Tizgui. It is worth noting that variations can occur either at the whole site (difference of about 0.72‰) but also at the cm scale in the same sample (here the largest observed difference is up to 0.40‰).

Regarding the Azegour skarn, there is no direct relationship for explaining the Mo fractionation in molybdenites between the facies or the two sites of sampling. Different processes will be discussed to explain the observed variability (redox conditions prevailing during the molybdenites deposits, late metamorphism phase...). Further investigations using Pb and S isotopic compositions will help deciphering the oxidation state and the origin of molybdenites regarding the possible different fluids.